

Zero Retries issue 0058 2022-08-05

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

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This issue of Zero Retries is pseudosponsored [by](#) **US Federal Communications Commission (FCC) Jobs**. If you are based within commuting range of Washington DC and have a technical background, there are a [number of job opportunities at the FCC](#).

Request To Send

Zero Retries Subscriber count is now 400+! Thanks Zero Retries Readers!

My late father, Chuck Stroh, had many pithy bits of wisdom to offer (as *all* Fathers do... me included). One of Dad's favorite bits of wisdom was that he didn't believe in "luck". Dad believed that "luck" was mostly "being prepared" (and yes, Dad *was* a [Boy Scout](#)). Dad enjoyed telling a story about "luck" from his college days. Dad was frugal and maintained a bit of savings. One weekend, a fraternity brother wanted to go to a big party, but didn't have any

money. He offered to sell Dad his nice hunting rifle² so he would have some money to to the party. They agreed on a price, and Dad enjoyed owning that rifle for decades. (Of course, after the party, the former owner of the rifle wanted to buy it back for what he sold it to Dad, but Dad respectfully declined. Dad was a shrewd bargainer.) Was Dad “lucky” that he had that bit of savings? No, Dad was *prepared* for such an opportunity.

Later, I heard Dad’s philosophy about luck expressed a bit more elegantly:

Luck is the intersection of preparation and opportunity.

Thus, I’m “lucky” about finding many stories to tell about technological innovation and experimentation in Amateur Radio, mostly because I’ve developed a methodology for being constantly on the lookout for such stories, know of a number of places to monitor, and I’ve developed a reasonable system for keeping track of them. And, of course, I then *write* the article highlighting the technological innovation and experimentation.

This approach is in contrast to many other Amateur Radio media that “invite” articles to be written and submitted for publication. But, those Amateur Radio media don’t actively monitor what’s going on, or actually write such stories in the usual situation that the subject or creator of something interesting doesn’t want to write the story themselves. The stories and subjects I write about in Zero Retries *could* be published in any number of venues... there *is* editorial space, and there are many, many capable writers available to tell such stories (as evidenced by the May 1995 issue of QST discussed in Zero Retries 0057). But, for whatever reason, in this era, that doesn’t happen - at least nearly often enough.

Three exceptions worth noting are Steve Ford WB8IMY’s *Eclectic Technology* column in QST Magazine, Don Rotolo N2IRZ’s *Digital Connection* column³ in CQ Magazine, and TAPR’s quarterly [Packet Status Register](#) newsletter.

Other than those exceptions, I think Amateur Radio is poorer for this paucity of coverage of technological innovation and experimentation. That was brought home when I was made aware of a “project” (apologies - I’m required to be vague) related to Amateur Radio that just didn’t quite... *grasp*... how unique Amateur Radio is in the 2020s related to the amount of technological innovation and experimentation *that is occurring*. And, correspondingly, *just how unique and valuable Amateur Radio is*, if only for that reason! An “evaluation of the available literature” relating to Amateur Radio just isn’t doing justice to Amateur Radio.

At least the message of Amateur Radio technological innovation and experimentation is reaching 400+ of you via Zero Retries. But, let’s face it folks... we need to get the word out more widely. I’m open to suggestions.

...

In Zero Retries 0043, I wrote about my quest to suggest to FlexRadio Systems ([FlexRadio](#)) that they should expand their product line to include a VHF / UHF version of their Software Defined Radio products.

Matt Youngblood KD5FGE is [President and CEO of FlexRadio](#). Gerald Youngblood K5SDR is the [creator](#) of the [SDR-1000](#) (which [“accidentally” launched FlexRadio](#)), and is now [Founder and Chairman of FlexRadio](#).

Dear Matt and Gerald:

I'm a fan of FlexRadio from the SDR-1000 days, but I'll not bury the lede here and come to the point:

Amateur Radio Operators in the US that are interested in experimentation and "... [\[contributing\] to the advancement of the radio art](#)" need a fully software-defined transceiver for VHF / UHF. I'm convinced that FlexRadio is the only company that could build one that's fully optimized for the US VHF / UHF bands.

Closing the loop on this subject - it was made clear at the FlexRadio banquet that I attended during Hamvention 2022 that Gerald Youngblood K5SDR had promoted himself beyond any operational responsibilities, thus I didn't attempt to contact him.

At Hamvention 2022, I was able to speak briefly to President and CEO of FlexRadio Matt Youngblood KD5FGE to plead my case for a FlexRadio VHF / UHF radio. Time didn't permit a long conversation, and I promised to follow up via email with a (written) "proposal".

I finally completed a reasonably compelling proposal and emailed it to KD5FGE, and he responded graciously within a few hours. I'll keep the content of the emails confidential, but I feel comfortable in saying that while KD5FGE was noncommittal, he wasn't dismissive. Thus, I'm encouraged that perhaps this idea *may* bear some fruit.

de Steve N8GNJ

A Pay and Play M17 Radio

Zero Retries readers sometimes send me down interesting rabbit holes. In Zero Retries 0056, I wrote:

I now have two identified paths for my personal experimentation with M17:

- I've ordered a [ZUM Radio MMDVM-Pi Board](#) from Ham Radio Outlet in the US⁴. It will be interesting to try to configure it for use with M17.
- As soon as it becomes available again, I plan to order a [Mobilinkd TNC3](#), which has solid support for M17 having worked with the M17 developers.

In a comment to Zero Retries 0057, subscriber Jim Ancona N1ADJ wrote:

I saw on the M17 Project Facebook group that Mike W2FBI is selling new TYT MD-UV380's with OpenRTX supporting M17: <https://tarxvf.tech/buy/>.

That link says:

New TYT MD-UV380 with M17 mod

This listing is for a dual band (2m/70cm) TYT MD-UV380 with the M17 mod applied. Availability is subject to upstream stock.

...

Buy MD-UV380 +M17 (\$200)

The modification itself is a one-time experimental modification that enables the transmission and reception of the [M17 digital protocol](#) when using the [OpenRTX replacement firmware](#). The only side effect with normal TYT firmware is that the VOX feature may be held open at some sensitivity levels.

This is an interesting new twist to the M17 saga for *actually getting on the air with M17*. With this, M17 is now plug and play (or more accurately, *pay* and play). In my opinion, \$200 is reasonable for a new unit, modified for M17, tested, and working. The modification required isn't just firmware, there's a delicate hardware modification required, and the modification involves surface mount components, thus it's delicate work. As an Electronic Technician that did some surface mount prototyping and minor repairs, I'd rather pay someone to do such work who's familiar with the unit in question and presumably has already discovered the costly mistakes.

For my purposes, the cost would be \$400 for two units as there's no M17 repeater in my area... yet. It would be fun to attempt a repeater coordination for an M17 repeater here in Western Washington:

Type of repeater?

- FM (no)
- C4FM (no)
- D-Star (no)
- DMR (no)
- NextEdge / NXDM (no)
- P25 (no)
- (No provision for none of the above 😊)

Looking around a bit more at <https://tarxvf.tech> is an interesting excursion into the activities of Mike McGinty W2FBI, such as this interesting bit:

[PyM17](#)

A micro Linux distribution for Raspberry Pis based on Alpine for MMDVM users of discriminating taste. Also provides packages for a number of MMDVM and M17 packages for regular Alpine. Runs on Raspberry Pi 0, 0w, 2, 3, and 4.

Although this description hints at a Linux package that supports M17 on a Raspberry Pi, the linked page talks about a Python library (I think...) rather than a Linux distribution. Still, intriguing idea that you could install a Linux package on a Raspberry Pi (which is actually pretty easy - [flash a MicroSD card](#)) and be running M17.

But, especially *this* gem:

[M17 Quickstart TX HackRF](#)

This is meant to be a series of short and sweet guide to a few ways to run M17 over RF today. This one focuses on transmitting and receiving M17 with m17-cxx-demod and GnuRadio. This'll require a little more Linux familiarity than the OpenWebRX guide, but it's not too bad.

M17 over networks, sans radio, is... interesting... but I'm an Amateur *Radio* Operator, and, for *me*, it only gets really fun once it involves *radio*.

ZR > BEACON

- [ARDC Sponsoring the DCC](#)

Amateur Radio Digital Communications (ARDC) has agreed to be a sponsor of the 2022 Digital Communications Conference (DCC), which is scheduled for September 16-18, 2022, in Charlotte, North Carolina.

[ARDC](#) is a private foundation that exists to support amateur radio and digital communication science and technology.

Kudos to ARDC for doing so!

- [\[DCC\] Still Calling for Papers](#)

Technical papers are still being solicited for the 41st Annual ARRL and TAPR Digital Communications Conference (DCC), September 16-18, 2022, in Charlotte, North Carolina. Papers will be published in the Conference Proceedings. Authors do not need to present at the conference to have their papers included in the Proceedings. Submit papers via e-mail to Maty Weinberg, KB1EIB (kb1eib@arrl.org) by September 1, 2022. Papers will be published exactly as submitted and authors will retain all rights.

Conference papers will be distributed as pdf's to DCC attendees. Printed copies of the papers will be available for sale at Lulu (www.lulu.com).

Paper and presentation topic areas include, but are not limited to software defined radio (SDR), digital voice, digital satellite communication, digital signal processing (DSP), HF digital modes, adapting IEEE 802.11 systems for Amateur Radio, Global Positioning System (GPS), Automatic Position Reporting System (APRS), Linux in Amateur Radio, AX.25 updates, Internet operability with Amateur Radio networks, TCP/IP networking over Amateur Radio, mesh and peer-to-peer wireless networking, emergency and homeland defense backup digital communications in Amateur Radio.

As I've said previously, papers for the DCC don't have to be (deeply) technical, just

relevant to Amateur Radio, preferably Amateur Radio communications that are digital. As someone who's submitted papers and been involved on the inside of the DCC, submitting a paper *isn't that tough*. It was always fun getting to read the DCC papers prior to the conference.

- **URESAT-1 is already a reality!** (via Google Translate)

URESAT-1 is part of the architecture used in the GENESIS, EASAT-2 and HADES missions but will include significant improvements, such as a 32-bit computer compared to the 8-bit computers of the previous satellites and improvements in the deployment mechanisms of antennas and batteries. As for its functionalities, it will have an FM VHF/UHF repeater and FSK frames, like its predecessors. This will allow you to perform QSOs in phony and retransmit AX.25 and APRS frames. The payload is not yet defined, but it could be the same SSTV camera that flies in HADES, a propellant or some type of experiment. Discussions are underway with universities and companies and are expected to be closed in the coming weeks. One of the projects that is confirmed is a chess game that will allow amateur radio players to play with the on-board computer as an opponent by sending FSK plots with the movements, to which the on-board computer will answer in its telemetry.

It will be the first satellite of the Union of Spanish Radio Amateurs (URE), in this project, the URE and AMSAT EA are making a great effort that will give us greater technological visibility, a modern association and at the forefront of telecommunications for use and enjoyment of its partners and all amateur radio in general.

The URE, together with a great team of technicians and engineers, has managed to launch the URESAT-1 satellite into space in the next mission of the Falcon 9 of the Space X Company -of the well-known businessman Elon Musk- in January of next year.

Inform you that if you are interested, you can collaborate through the Web:

<https://uresat.ure.es/donaciones/> and help in this great URE project.

For more information, including many technical details, the URE has also created a WordPress blog where the status of the project will be reported, including details of the functionalities and techniques.

The blog can be consulted [at] <https://uresat.ure.es>

URE is employing a novel (to me) funding mechanism - donors get various mentions transmitted from the satellite. Example:

***KING** [chess piece]*

To contributions of between €501 and €1000

Your callsign on CW in a sure way from time to time, plus a random SSTV image with others and your own voice on the satellite voice beacon and your own image on SSTV.

Printed certificate gift + URESAT pin + mission patch + URESAT mug + URESAT cap + URESAT T-shirt.

- **Hacking the RF Protocol of an Obscure Handheld Game**

Armed with an RTL-SDR, GNU Radio, Inspectrum, and a bit of Python, [Zach] was able to identify the signal and begin the process of decoding it. This is where things get really

interesting, as the details of his reverse engineering process are [widely applicable for all sorts of unknown RF signals](#). Even if you're like most people and have nearly zero interest in failed handheld games of the early 2000s, it's well worth a read. The same techniques he uses to figure out the name and physical characteristics of the invisible foe his game is transmitting could one day help you figure out how to [manipulate the data from that wireless weather station](#) you've got in the backyard.

As this excerpt points out, the notable and Zero Retries Interesting bit in this article and tutorial is that the process of reverse engineering *this* RF data protocol is widely applicable to other radio devices. Security through obscurity, at least for anything radio, hasn't been an option for a long time, but especially now that reverse engineering is within the realm of hobbyists with inexpensive (but highly capable) tools, a bit of knowledge, patience, and time.

Feedback Loop

Alan Beard VK2ZIW re: Zero Retries 0056 -

My mods to "freebeacon" from David VK5DGR are on github.com/AlanVK2ZIW/freebeacon

On receipt of the trigger will retransmit your voice message.

FreeDV beacon With repeat:

- *Listens for FreeDV signals, then transmits a reply.*
- *Supports FreeDV 700D and 700E modes.*
- *Places the received signals as files.*
- *Requires a Linux machine with a sound card and RS232-PTT (or Hamlib CAT) interface to your radio.*
- *Just one sound card is required.*
- *Can run on machines as small as a Raspberry Pi.*
- *Now running with Codec2 API Ver 1.0.5*

When a "trigger" string is detected in the rx FreeDV text message (e.g. "/" as in "/" de VK2ZZZ"), the beacon will transmit your signal and an ident with BER stats back to you. This is pretty cool - like an enhanced [ping](#) for FreeDV.

Zero Retries Sponsorships Available

The Zero Retries advisers will ~~probably~~ cringe that I'm mentioning sponsorships without a solid plan in place, but in service to keeping Zero Retries going long term, I'm opening Zero Retries up to sponsorships from "Zero Retries Interesting" companies, organizations, projects, individuals, etc. More details will emerge in future issues, but for now, if you're interested in a sponsorship message appearing in Zero Retries, please reach out - it's early days. More

importantly, if you know of a company, organization, project, or individual that you think could / would / should sponsor Zero Retries, please point out Zero Retries to them.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out **Join the Fun on Amateur Radio** for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing *Thanks* to:

- Tina Stroh KD7WSF for, well, *everything*!
- Pseudostaffer [Dan Romanchik KB6NU](#) for continuing to spot, and write about “Zero Retries Interesting” items on his blog that I don’t spot on my own.
- [Amateur Radio Weekly](#) and [Southgate Amateur Radio News](#) consistently surface “Zero Retries Interesting” stories.
- The [Substack email publishing platform](#) makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click:

Subscribe now

If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries is on Twitter @ZeroRetries - just click:

[Zero Retries on Twitter](#)

Please tell your friends and co-conspirators about Zero Retries - just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy; yes, you guessed it... just click:

Leave a comment

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc. I don’t use such information in any way other than seeing that most subscribers actually do read Zero Retries.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted in beautiful Bellingham, Washington, USA

2022-08-05

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I owe them from way back).

[1](#)

Pseudosponsored is my created name for a “sponsorship” message that wasn’t actually solicited by the organization cited.

[2](#)

This was the late 50’s / early 60’s, and the rifle in question was a bolt action.

[3](#)

In my opinion, N2IRZ’s Digital Connection column alone is worth subscribing to CQ. My subscription has lapsed for some time, and I need to resubscribe. (Now fixed.)

[4](#)

Ham Radio Outlet responded with their usual efficiency and within days I had a ZUM Radio MMDVM-Pi Board. Now to ~~find~~ make some Amateur Time Units (ATUs) to mate it with a Raspberry Pi and get it connected to a radio.